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TEST UNIT FOR REAL TIME TESTING OF DOCUMENTS
[PRÜFGERÄT ZUR ECHTHEITSPRÜFUNG VON DOKUMENTEN]

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Description

The invention concerns a test device for real-time testing of documents, in particular of certificates, passports, bank notes, checks, check or credit cards, stamps, and documents provided with security features, by means of light beams with light sources for visible light and for LTV light and illumination within a test device. It may be used for toll takers, border protection officers, police and other institutions that check documents for authenticity.

A number of test units for checking the authenticity of documents area already known.

EP 0 622 762 describes a test unit that works with UV light and directs light beams to the object being checked and to a light detector by means of a glass prism at the same time. However, the construction of this test unit is relatively complicated. DE-GBM 94 01 537 discloses a device for checking the authenticity of documents provided with security features, such as bank notes, checks, check cards, stamps, or the like, with a first light source for visible light and a second light source for ultraviolet light, in the case of which a light source with visible light serves for transilluminating the object being checked. Another light source with LTV light is used for illuminating the document being checked. Both transillumination and illumination may be carried out independent of one another. The test unit in this case is designed so that the light beams of these two light sources are directed in different directions. Of course, not all types of documents can be checked for authenticity with this test unit.

Test units having only one light source also are known. Thus DE-GBM 93 07 913 describes a test device for bank notes and documents in which authenticity is checked with only a single light source, in particular a UV light source. This solution has the disadvantage that only a single security feature reacting to UV light can be checked as a proof of authenticity.

In another solution, as described in DE-GBM 93 13 587, a test unit, that responds to ferromagnetism, is installed for checking authenticity in addition to a checking by means of UV light. The ferromagnetism checking device brings no additional detection gain which concerns the authenticity of most documents.

In particular for bank notes, number of test methods and test devices, in which the characteristic feature for bank notes, the metal thread or threads, respectively metal strips, bands, or metal particles, is evaluated. These solutions are suited only for bank notes and require expensive equipment. For examples, solutions of this kind are known from DE-OS 44 15 592, 195 10 303, 195 18 228, and DE-GBM 296 04 504. However, this security feature may be evaluated in different ways.

The object of the invention is to create a test unit for checking the authenticity of documents, in particular of certificates, passports, bank notes, checks, check or credit cards, stamps and documents provided with security features, that makes it possible to check all national and international documents for all security features provided simultaneously and to be able to exclude falsifications with great reliability.

The object is achieved according to the invention by creating a test unit for checking the authenticity of documents having the features of the characterizing part of the first Patent Claim. All national and international documents, such as certificates, passports, bank notes, checks, check or credit cards, stamps, and documents provided with security features can be checked for their authenticity with the test unit according to the invention by means of a comprehensive visual checking both with incident light and horizontal light. The characteristic features for bank notes, metal thread or threads, respectively metal strips, metal bands, or metal particles also can be checked by means of visual checking with the test unit according to the invention. The unit detects security features and checks special papers, as well as security laminations, that are made visible by normally visible white light, white light - transilluminated light, UV incident light, UV horizontal light, and polarized light, with the optional simultaneous use of a variable illuminated magnifying lens function that can be connected to extra illumination of the object to be checked. Checking with infrared light as needed also is possible, by optionally mounting an infrared light source having an infrared image converter in the test unit.

According to the invention the individual light sources are screened so that eye shades can be reliably avoided. The loading for the checking person is further reduced by using UV light of low intensity.

In another embodiment, instead of a light source that emits polarized light, a normal light source is located in the test unit. Then an adapter that contains a test unit, here, for example, an

optionally swiveling polarization filter, then is mounted in the beam path to the test object in this place.

In one embodiment, a normal light source having UV glass located in the beam path to the object can be used for the UV light sources.

If the data, respectively character information obtained from the authenticity checking is to be evaluated by computer and the result of a test process is to be stored, a video camera and/or a camera and/or electronic image evaluation element is/are located on the test unit in one preferred version of the invention.

In addition, a reversing mirror insert with a special prism introduced in the beam path to the test object can be mounted in the test unit for checking the authenticity of documents.

It is advantageous to mount optionally exchangeable color filters capable of being inserted in the beam path to the test object on the individual module having the visible light source.

The invention is to be described in greater detail below in a preferred embodiment by means of Figs. 1 to 4.

Fig. 1 shows a test unit consisting of several plug-in individual modules with mountable adapters,

Fig. 2 shows the side view of a test unit having an attached transport module 5 and a device module 4 in an embodiment not having an adapter,

Fig. 3 shows the individual modules separated from one another in each case from the inside of the test unit, and

Fig. 4 shows the optionally mounted adapters A, B, C, and D.

In a preferred embodiment, the test unit according to the invention consists of a base module **1**. This base module **1** contains

the electric supply unit. The housing of this base module **1** is provided at specific positions with openings, in which there are plug connections. A fastening device **7** for adapters A, B, C, or D is mounted on the side that forms the inside of the device after assembly. In addition to plug connections, an optionally also switchable, individual visible light source **8** is located in this place. This light source **8** is switched on or off depending on the connected adapter. The head module **2** is mounted on the base module **1**. A movable observation window **9** is located in the middle of the module **1**. Two UV lamps **10** are integrated in the head module **2** on both sides of the movable observation window **9** on the side of the head module **2** that is located beside the fastening device **7** of the gas module **1** when it is plugged together. Further UV lamps are located in a UV light box **11** in the foot module **3** opposite the UV lamps **10** of the head module **2**, to the interior of the test unit. Each of the two UV lamps has a power of at most **8** watts. A special mirroring is mounted within the UV light box. The mirroring consists of a dish-shaped half-round mirror. A white light box **12** is located on the other side of the foot module **3**, on the inside of the test unit. In this case, the white light source, that operates with wave lengths in the nanometer range, is specially provided with a reflecting coating in the interior of the white light box **12**. The white light box **12** can be designed so that optionally exchangeable color filters that can be inserted between the visible light source in the beam path to the test object, are mounted as covering of the white light box **12** (not shown in Fig. 3). In particular, chemical compounds and color authenticity can be checked with these special color filters that may be inserted or exchanged as

desired. Similar color filters can also be mounted between the white light box **12** in the head module **2**.

The individual modules according to the invention: base module 1, head module **2**, and foot module **3** can be plugged into one another so that there is mechanical locking between one another via the plugs as well as electric contact with each other and simultaneously.

A movable object carrier, that holds the document to be checked for authenticity, can be mounted in the interior of the test unit if needed (not shown in the figures).

In the embodiment according to the invention, a test procedure that may be performed as needed by simply plugging in adapters A, B, C, or D, is possible so that the individual authenticity features are detected via adapters A, B, C, or D by means of the checking possibilities according to Patent Claims 2 to 5. In this case the adapters can be designed so that they, if necessary, draw their power from the base module 1 via plug connections.

A polarization filter that may be swiveled as desired may be put into operation with the arrangement of adapter A in the beam path to the test object. Thus it is possible to check authenticity with polarized light, it being possible to reliably detect falsifications with respect to films having reflecting films and specially introduced security features.

In adapter B is mounted in the beam path to the test object on the base piece **1**, an optionally adjustable magnifying lens is used. In particular, very small details, such as, e.g., fibers, letters, and chemical substances can be checked by means of using the magnifying lens function.

If an optionally adjustable inverting mirror insert with an intercalated special prism is mounted in the test unit on the base piece **1** via an adapter C in the beam path to the test object, mirror-writing characters, backgrounds, or traces of the documents to be checked can be made visible.

The interior of adapter D contains an infrared radiation source, that draws its energy via the plug connections of the fastening element 7 after being connected. Further, it contains an infrared image converter. If adapter D is mounted in the test unit in the beam path to the test object, both the infrared radiation source and the infrared image converter are used. Thus authenticity checking of the document to be checked for novel checking features can be carried out with the test unit according to the invention.

For example, if the evaluation result is to be documented photograhically or electronically, a carrier module **7** is mounted on the observation window **9** of the head module **2** of the test unit in order to evaluate the test procedure. As needed, it contains in its interior a video camera and/or a conventional camera and/or electronic image evaluating elements.

In this case it is advantageous to evaluate and/or store the test signals by means of computer technology. Semi-automatic or completely automatic authenticity checking also is possible in this way. In an advantageous embodiment, in the case of automatic image evaluation a transport module **5** is attached via the foot module **3**. This takes over the automatic transport of the document being checked through the test unit during the entire checking process.

If the test unit according to the invention also is made theft-proof by encapsulation and correspondingly permanently anchored, in the case of detecting a document falsification the document can remain in the test unit and corresponding evaluation signals can be issued automatically.

In one embodiment, as is shown in Fig. 2, instead of adapter A, B, C, or D, a device module **4** is mounted on the base module **2**. In this case the individual units, that otherwise are connected via the individual adapters, are put together as a whole in, respectively on device module **4**. According to the invention, device module **2** has a light source for generating polarized light with a separately mounted adjustable and thus illuminable magnifying lens, an adjustable inverting mirror insert with intercalated special prism, and an infrared radiation source with an infrared converter. In this case, all individual units of the device module **4** including the associated light sources can be connected individually or optionally in any way and used for document checking. With this arrangement in the device carrier the same authenticity checking procedures are used for the documents to be checked, as can be performed in the adapter design.

The individual light sources can be adjustably screened with respect to the observed for safety reasons. A design of an adjustable screening is indicated in Fig. 2.

Instead of the construction of several plug-in individual modules, a compact design as a device that performs all functions according to the individual modules also is conceivable.

An embodiment in a mobile test unit in miniaturized form also is conceivable. Of course, in this case a design consisting of individual

testing attachments is necessary, it being possible to check the individual security features by visual checking. This miniaturized test unit can be carried on the body of a person and used as needed in any location, e.g., on a police beat.

List of Reference Numbers Used

1 base module

2 head module

3 foot module

4 device module

5 transport module

6 carrier module

7 fastening device for adapter

8 visible light source

8 movable observation window

10 UV lamps

11 UV light box

12 white light box

Patent Claims

1. A test device for real-time testing of documents, in particular of certificates, passports, bank notes, checks, check or credit cards, stamps, and documents provided with security features, with light sources for visible light and for UV light and illumination within a test device, wherein the test unit consists of several individual modules or of several individual modules with adapters containing checking devices that can be mounted thereon,
at least one individual module is made as an electric supply unit, the individual modules can be plugged into one another, an electric

contact being made at the same time,
at least one visible light source having a wave length in the nanometer range being mounted in an individual module,
UV light from at least two UV light sources having a power of at most 8 watts being located in two individual modules, at least one UV light source being located in an individual module under an object carrier that can may be moved as desired,
and/or a light source for creating polarized light is located in an individual module,
and/or a light source that can be switched on as desired for a separately mounted adjustable illuminable magnifying lens is located in an individual module,
and/or an infrared radiation source having an infrared image converter is located in an individual module, and
all light sources can be switched on individually and/or together and the light sources may be screened with respect to the observer.

2. The test unit for checking the authenticity of documents according to Claim 1, wherein a polarization filter that can be swiveled as desired can be mounted in the test unit via an adapter (A) in the beam path to the test object.

3. The test unit for checking the authenticity of documents according to Claim 1, wherein a magnifying lens that can be adjusted as desired is mounted in the test device via an adapter (B) in the beam path to the test object.

4. The test unit for checking the authenticity of document according to Claim 1, wherein an inverting mirror insert that can be adjusted as desired, with an intercalated special prism, can be

mounted in the test unit via an adapter (C) in the beam path to the test object.

5. The test unit for checking the authenticity of documents according to Claim 1, wherein an infrared source having an infrared image converter can be mounted in the test unit via an adapter (D) in the beam path to the test object.

6. The test unit for checking the authenticity of documents according to Claim 1, wherein the UV light sources consist of a normal light source with UV glass located in the beam path to the test object.

7. The test unit for checking the authenticity of documents according to Claim 1, wherein a video camera and/or a camera and/or electronic image evaluating elements may be mounted on the test unit over an observation window in one of the individual modules for evaluating the test process, the test signals advantageously being evaluated and/or stored by means of computer technology.

8. The test unit for checking the authenticity of documents according to Claim 1, wherein an additional transport module may be mounted on an individual module.

9. The test unit for checking the authenticity of documents according to Claim 1 or 8, wherein the test unit is encapsulated to make it theft-proof.

10. The test unit for checking the authenticity of documents according to Claim 1 or 8, wherein color filters that may be exchanged as desired, capable of being inserted in the individual module with the visible light source in the beam path to the test object.

11. The test unit for checking the authenticity of documents according to Claim 1 and 10, wherein color filters that may be exchanged as desired can be inserted into a further individual module without a visible light source in the beam path to the test object.

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4 pages of drawings appended

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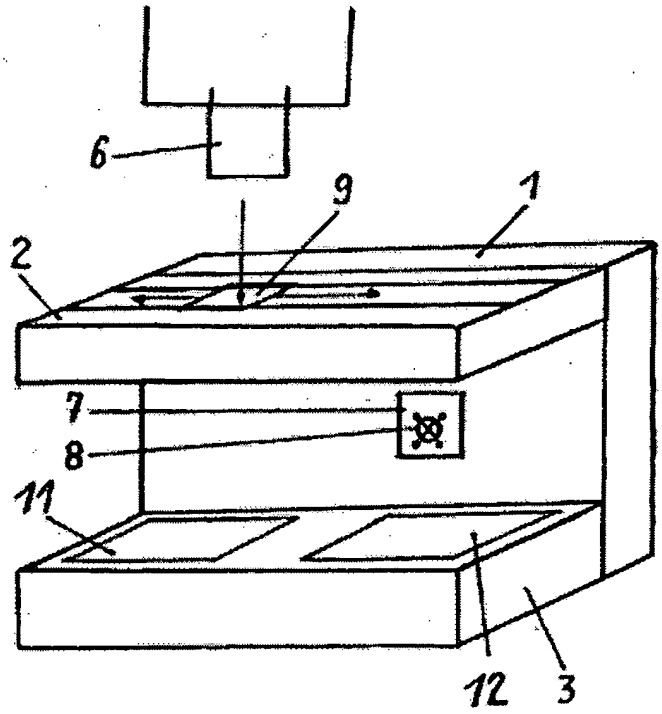

Fig. 1

DRAWINGS PAGE 2

Number: DE 199 23 885 A1
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Publication date: 20001130

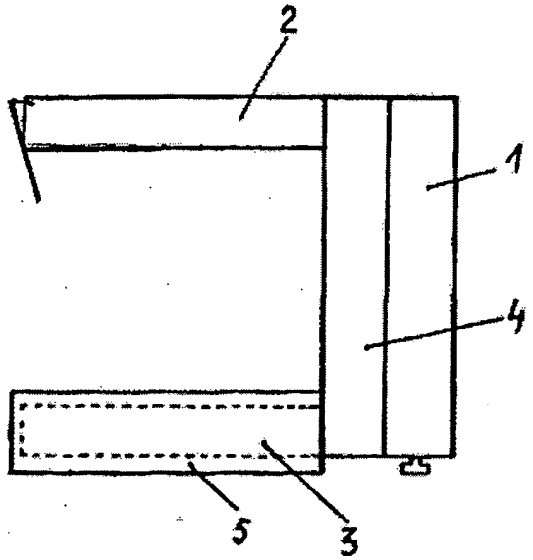

Fig. 2

Number: DE 199 23 885 A1
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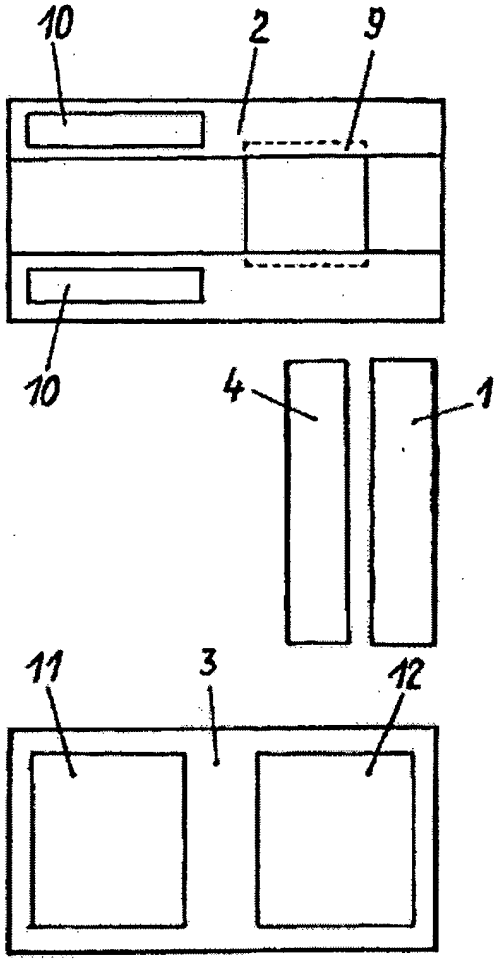

Fig. 3

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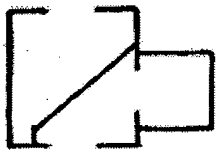

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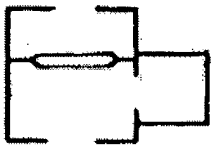

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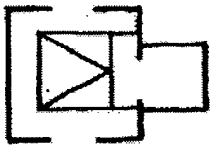

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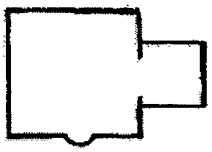

D

Fig. 4